

Exhibit C-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

EXPRESS MAIL NUMBER: EV 977 525 429 USDATE OF DEPOSIT: November 30, 2007

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Rosa A. Caviedes

* * *

CERTIFICATE OF MAILING BY EXPRESS MAIL

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P.O. Box 1450
Alexandria, VA 22313-14500

Sir:

Transmitted herewith for filing is the following:

1. Transmittal Form;
2. Request for Inter Partes Reexamination Transmittal Form (+1 copy);
3. Attachment to Request Inter-Partes Re-Examination of
U.S. Patent No. 6,857,001;
4. Information Disclosure Statement & PTO-1449 w/12 references;
5. Certificate of Mailing By Express Mail No.: EV 977 525 429 US; and
6. Return Post Card.

EV977525429US

PTO/SB/21 (10-07)

Approved for use through 10/31/2007. OMB 0651-0031
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**TRANSMITTAL
FORM**

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

U.S. Patent No.

6,857,001

Filing Date

June 7, 2002

First Named Inventor

Hitz et al.

Art Unit

N/A

Examiner Name

N/A

Attorney Docket Number

347155-29

ENCLOSURES (Check all that apply)

- | | | |
|--|--|---|
| <input type="checkbox"/> Fee Transmittal Form
<input type="checkbox"/> Fee Attached
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<input checked="" type="checkbox"/> Information Disclosure Statement & PTO-1449 with 12 references
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<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
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1. Attachment to Request for Inter-Partes Re-Examination of U.S. Patent No. 6,857,002; and
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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	DLA Piper US LLP		
Signature	<i>Ronald L. Yin</i>		
Printed name	Ronald L. Yin		
Date	November 30, 2007	Reg. No.	27,607

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Signature	<i>Ronald L. Yin</i>		
Typed or printed name	Ronald L. Yin	Date	November 30, 2007

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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(Also referred to as FORM PTO-1465)

REQUEST FOR INTER PARTES REEXAMINATION TRANSMITTAL FORM

Address to:
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attorney Docket No.: 347155-29

Date: November 30, 2007

1. ☒ This is a request for *inter partes* reexamination pursuant to 37 CFR 1.913 of patent number 6,857,001 issued February 15, 2005. The request is made by a third party requester, identified herein below.
2. ☒ a. The name and address of the person requesting reexamination is:

Ronald L. Yin
DLA Piper US LLP
2000 University Avenue, East Palo Alto, CA 94303

b. The real party in interest (37 CFR 1.915(b)(8)) is: Sun Microsystems, Inc.
3. ☐ a. A check in the amount of \$ _____ is enclosed to cover the reexamination fee, 37 CFR 1.20(c)(2);
- ☒ b. The Director is hereby authorized to charge the fee as set forth in 37 CFR 1.20(c)(2) to Deposit Account No. 07-1896 (submit duplicative copy for fee processing); or
- ☐ c. Payment by credit card. Form PTO-2038 is attached.
4. ☒ Any refund should be made by ☐ check or ☒ credit to Deposit Account No. 07-1896 37 CFR 1.26(c). If payment is made by credit card, refund must be made to credit card account.
5. ☒ A copy of the patent to be reexamined having a double column format on one side of a separate paper is enclosed. 37 CFR 1.915(b)(5)
6. ☐ CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
☐ Landscape Table on CD
7. ☐ Nucleotide and/or Amino Acid Sequence Submission
If applicable, items a. - c. are required.
 - a. ☐ Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i ☐ CD-ROM (2 copies) or CD-R (2 copies); or
 - ii ☐ paper
 - c. ☐ Statements verifying identity of above copies
8. ☒ A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.
9. ☒ Reexamination of claim(s) 1-63 is requested.
10. ☒ A copy of every patent or printed publication relied upon is submitted herewith including a listing thereof on Form PTO/SB/08, PTO-1449, or equivalent.
11. ☒ An English language translation of all necessary and pertinent non-English language patents and/or printed publications is included.

[Page 1 of 2]

This collection of information is required by 37 CFR 1.915. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Mail Stop Inter Partes Reexam, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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12. ☒ The attached detailed request includes at least the following items:

- a. A statement identifying each substantial new question of patentability based on prior patents and printed publications. 37 CFR 1.915(b)(3)
- b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR 1.915(b)(1) and (3)

13. ☒ It is certified that the estoppel provisions of 37 CFR 1.907 do not prohibit this reexamination. 37 CFR 1.915(b)(7)14. ☒ a. It is certified that a copy of this request has been served in its entirety on the patent owner as provided in 37 CFR 1.33(c).The name and address of the party served and the date of service are:
Steven A. Swernofsky

Swernofsky Law Group PC

P.O. Box 390013, Mountain View, CA 94039-0013

Date of Service: November 30, 2007; or

☐ b. A duplicate copy is enclosed since service on patent owner was not possible.

15. Correspondence Address: Direct all communications about the application to:

☒ The address associated with Customer Number: 26379

OR

☐ Firm or
Individual Name

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Country

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16. ☒ The patent is currently the subject of the following concurrent proceeding(s):

- ☐ a. Copending reissue Application No. _____
- ☐ b. Copending reexamination Control No. _____
- ☐ c. Copending Interference No. _____
- ☒ d. Copending litigation styled: _____

Network Appliance, Inc. v. Sun Microsystems, Inc.

9:07CV206 USDC ED TX. (Lufkin Div)

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Authorized Signature For Third Party Requester

Ronald L. Yin

November 30, 2007

Date

27,607

Typed/Printed Name

Registration Number, if applicable

PTO/SB/58 (09-07)

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REQUEST FOR INTER PARTES REEXAMINATION TRANSMITTAL FORM

Address to:

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 P.O. Box 1450
 Alexandria, VA 22313-1450

Attorney Docket No.: 347155-29

Date: November 30, 2007

1. ☒ This is a request for *inter partes* reexamination pursuant to 37 CFR 1.913 of patent number 6,857,001 issued February 15, 2005. The request is made by a third party requester, identified herein below.
2. ☒ a. The name and address of the person requesting reexamination is:
- Ronald L. Vin
DLA Piper US LLP
2000 University Avenue, East Palo Alto, CA 94303
- b. The real party in interest (37 CFR 1.915(b)(8)) is: Sun Microsystems, Inc.
3. ☐ a. A check in the amount of \$ _____ is enclosed to cover the reexamination fee, 37 CFR 1.20(c)(2);
- ☒ b. The Director is hereby authorized to charge the fee as set forth in 37 CFR 1.20(c)(2) to Deposit Account No. 07-1896 (submit duplicative copy for fee processing); or
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6. ☐ CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
☐ Landscape Table on CD
7. ☐ Nucleotide and/or Amino Acid Sequence Submission
If applicable, items a. - c. are required.
- a. ☐ Computer Readable Form (CRF)
- b. Specification Sequence Listing on:
- i. ☐ CD-ROM (2 copies) or CD-R (2 copies); or
- ii. ☐ paper
- c. ☐ Statements verifying identity of above copies
8. ☒ A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.
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[Page 1 of 2]

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- b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR 1.915(b)(1) and (3)

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Steven A. Swernofsky

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P.O. Box 390013, Mountain View, CA 94039-0013

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- ☐ b. Copending reexamination Control No. _____
- ☐ c. Copending Interference No. _____
- ☒ d. Copending litigation styled: _____

Network Appliance, Inc. v. Sun Microsystems, Inc.

9:07CV206 USDC ED TX. (Lufkin Div)

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Authorized Signature For Third Party Requester

Ronald L. Yin

November 30, 2007

Date

27,607

Typed/Printed Name

Registration Number, if applicable

M/S Inter Partes Reexam
Commissioner for Patents
P.O. Box 1450,
Alexandria, VA 22313-1450

US Patent: 6,857,001
Issued: February 15, 2005
DLAP File No.: 347155-29

By: RLY:rac

Title: **MULTIPLE CONCURRENT ACTIVE FILE SYSTEMS**

Mail Date: November 30, 2007

Due Date: N/A

The following have been received in the U.S. Patent and
Trademark Office on the date stamped hereon:

1. Transmittal Form;
2. Request for Inter Parte Reexamination Transmittal Form;
3. Attachment to Request for Inter-Partes Re-Examination of
U.S. Patent No. 6,857,001; and
4. Information Disclosure Statement & PTO-1449; w/12 references;
5. Certificate of Mailing By Express Mail No.: EV 977 525 429 US; and
6. Return Post Card.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hitz et al.

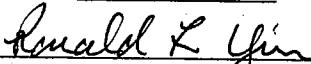
U.S. Patent No. 6,857,001

Issued: February 15, 2005

Filed: June 7, 2002

Docket No.: 347155-29

Title: MULTIPLE CONCURRENT ACTIVE FILE SYSTEM

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage Via Express Mail No. EV 977 525 429 US in an envelope addressed to: Commissioner of Patents, MS Inter Partes REEXAM, P.O. Box 1450, Alexandria, VA 22313-1450, on:
November 30, 2007

Ronald L. Yin

* * *

ATTACHMENT TO REQUEST FOR INTER-PARTES RE-EXAMINATION OF U.S.
PATENT NO. 6,857,001

Mail Stop *Inter Partes* Reexam
Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

Pursuant to 35 U.S.C. §§ 311-318 and 37 CFR § 1.903-1.997, this is a request for inter-partes reexamination of United States Patent No. 6,857,001 which issued on February 15, 2005 to Hitz et al. (the "'001 Patent").

I. CLAIMS FOR WHICH REEXAMINATION IS REQUESTED

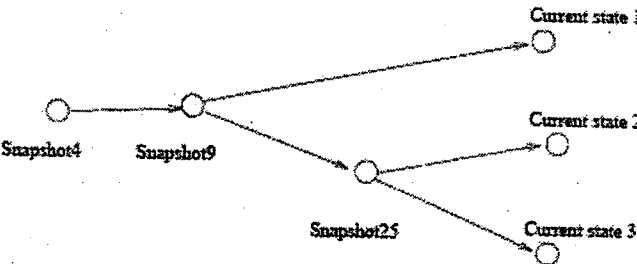
Reexamination is requested of Claims 1-63 of the '001 Patent in view of the prior art listed on the Citation of Prior Art under 37 CFR § 1.501 and 35 U.S.C. § 301 which is submitted with the Request for Reexamination.

First Basis of Invalidity

The references applicable to the first basis of invalidity are:

1. Hitz et. al, *File System Design For An NFS File Server Appliance*, TR3002, USENIX January 19, 1994 (Hereinafter: "Hitz")
2. Ylonen et. al, *Concurrent Shadow Paging: Snapshots, Read-Only Transactions, and On-The-Fly Multilevel Incremental Dumping*, TKO-B104, Laboratory of Information Processing Science at Helsinki University of Technology, 1993. (Hereinafter: "Ylonen"). Although this document is undated on its face, it is referenced in Ylonen et. al, *Concurrent Shadow Paging: Fine-Granularity Locking with Support for Extended Lock Modes and Early Releasing of Locks*, Laboratory of Information Processing Science at Helsinki University of Technology (see Footnote [17], page 28), referencing Ylonen as being published in 1993.

The pertinence and manner of applying Ylonen and Hitz to the claims for which re-examination is requested is as follows:

Claims of '001 Patent	Ylonen and Hitz
<p>1. A method of operating data storage, the method including maintenance of plural active file systems, wherein each of the active file systems initially access data shared with another of the active file systems, and wherein changes made to each of the active file systems are not reflected in the active file system with which the changed active file system shares the data.</p>	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 13) This is further illustrated in Ylonen Fig.3:</p>  <pre> graph LR S4((Snapshot4)) --> S9((Snapshot9)) S9 --> CS1((Current state 1)) S9 --> CS2((Current state 2)) S9 --> CS3((Current state 3)) S4 -.-> CS1 S4 -.-> CS2 S4 -.-> CS3 </pre> <p>Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file</p>

	<p>system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
2. A method as in claim 1, wherein when a second active file system is created based on a first active file system, the first active file system and the second active file system initially share data.	<p>Ylonen teaches in section 3.4 and Fig. 3 that a second active database version (e.g. Current State 2 in Fig. 3) is created based on a first active database version (Current State 1), with the two versions initially sharing data (Snapshot 9).</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
3. A method as in claim 2, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p>

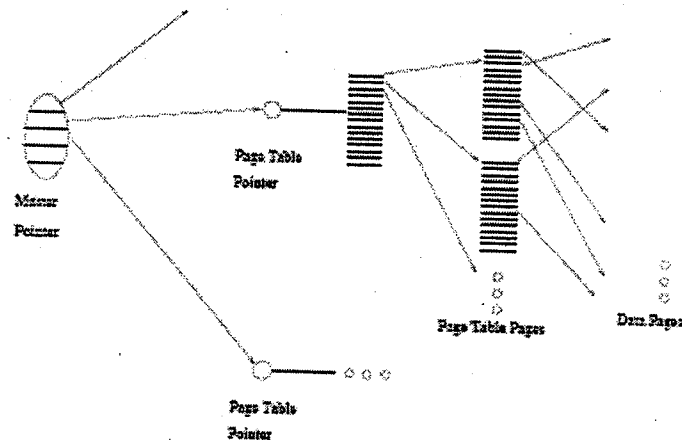


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

4. A method as in claim 2, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

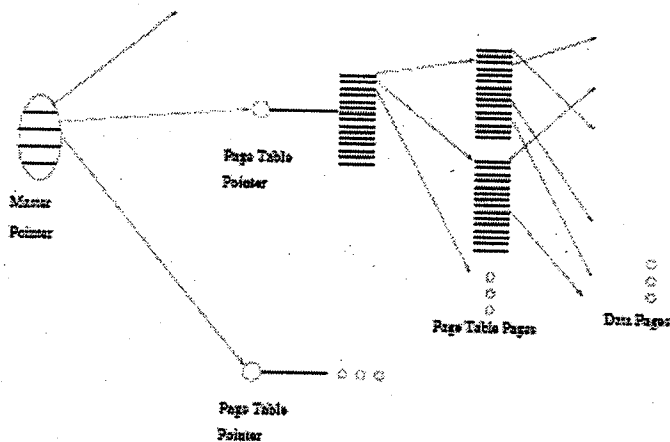


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

5. A method as in claim 1, wherein snapshots are made of ones of the plural active file systems, each snapshot forming an image of its respective active file system at a past consistency point.

Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots. Ylonen section 3.4 teaches modifying such snapshots that are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy,

and these modifications will not affect other copies.” (page 12). This is further illustrated in Ylonen Fig.3:

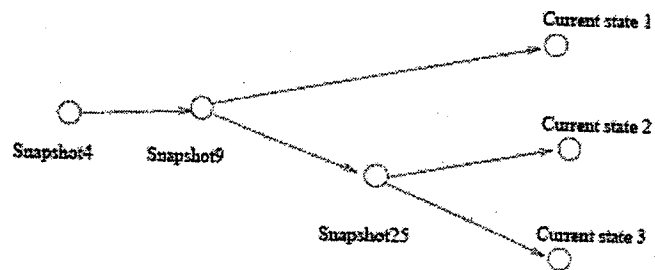


Fig. 3 teaches that Snapshot 9 is an image of active database version Current State 1 at a past consistency point, while Snapshot 25 is an image of active database version Current State 2.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

6. A method as in claim 5, wherein each snapshot includes a complete hierarchy for file system data, separate and apart from active file system data for the plural active file systems.

Ylonen Fig. 5 and the text in section 3.5 teach that each permanent snapshot includes a hierarchy of system data, such as Page Table Pointer and Page Table Pages. Some of these permanent snapshots are active database versions.

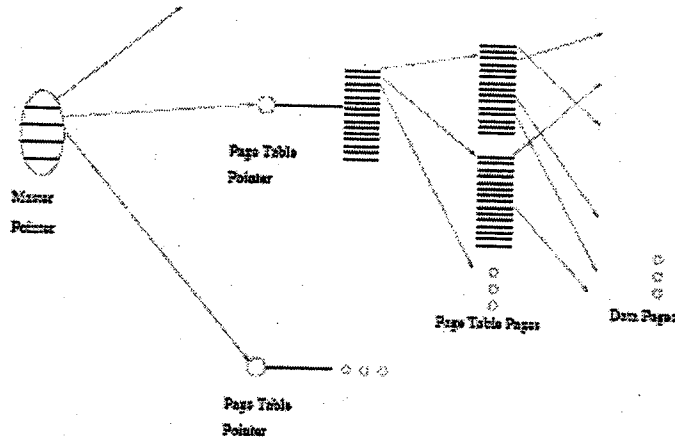


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

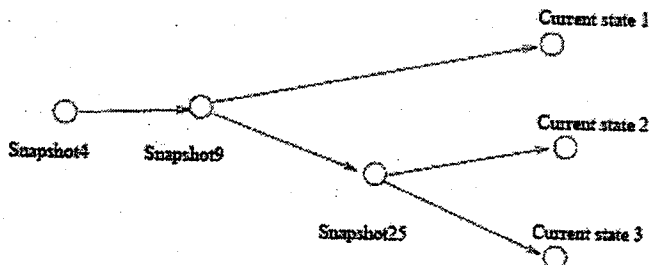
Furthermore, Hitz Figs. 3 and 4 at p. 11 teach that an active file system and snapshots have separate file system data hierarchies.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

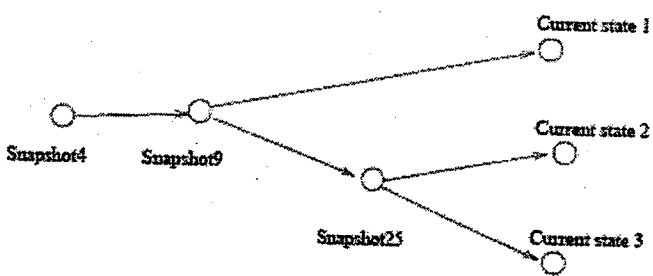
Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

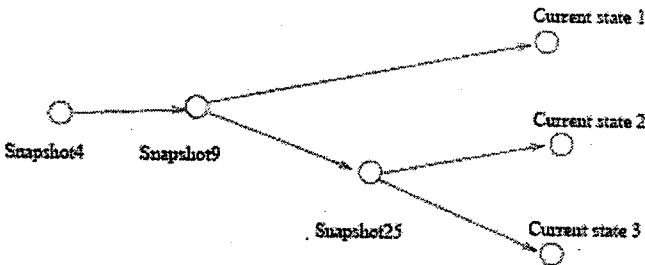
7. A method as in claim 5, wherein at least one of the snapshots is converted into a new active file system.

Ylonen Fig. 3 teaches snapshots converted to active database versions.



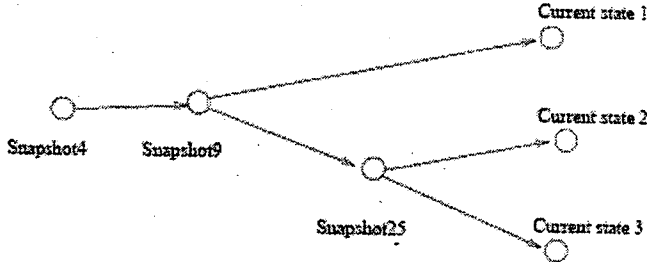
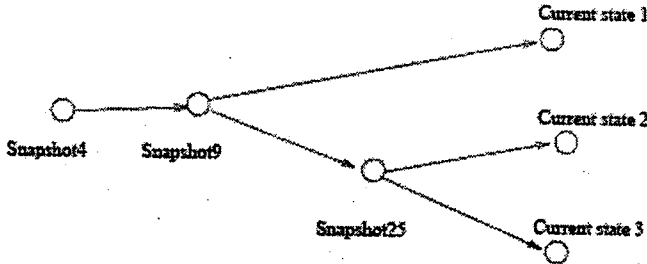
Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-

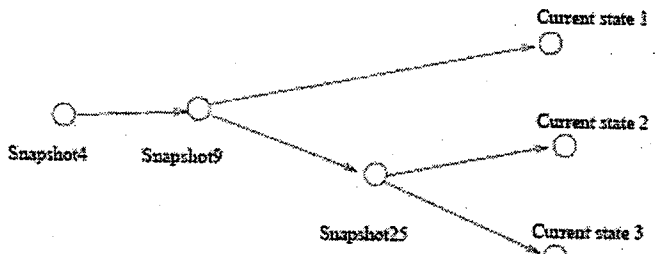
	<p>write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
8. A method as in claim 7, wherein the one of the snapshots is converted by making the one of the snapshots writable.	<p>Ylonen section 3.4 teaches allowing modifications to certain snapshots so as to convert them to writable.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
9. A method as in claim 8, wherein snapshot pointers from any of the active file systems to the new active file system are severed.	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>  <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file</p>

	<p>system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>10. A method of creating plural active file systems, comprising the steps of: making a snapshot of a first active file system, the snapshot initially sharing data with the first active file system; and converting the snapshot to a second active file system by making the snapshot writable, with changes made to the first active file system not reflected in the second active file system, and with changes made to the second active file system not reflected in the first active file system.</p>	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). This is further illustrated in Ylonen Fig.3:</p>  <p>Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily</p>

	appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.
11. A method as in claim 10, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p> <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p> <p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily</p>

	<p>appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>12. A method as in claim 10, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.</p>	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12) Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p> <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p> <p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily</p>

	<p>appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>13. A method as in claim 10, further comprising the step of severing any snapshot pointers from the first active file system to the second active file system.</p>	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>  <pre> graph LR S4((Snapshot4)) --> S9((Snapshot9)) S9 --> CS1((Current state 1)) S9 --> S25((Snapshot25)) S25 --> CS2((Current state 2)) S25 --> CS3((Current state 3)) </pre> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>14. A method as in claim 10, further comprising the steps of making snapshots of ones of the plural active file systems.</p>	<p>Fig. 3 teaches that Snapshot 9 is a snapshot of active database version Current State 1 while Snapshot 25 is a snapshot of active database version Current State 2.</p>  <pre> graph LR S4((Snapshot4)) --> S9((Snapshot9)) S9 --> CS1((Current state 1)) S9 --> S25((Snapshot25)) S25 --> CS2((Current state 2)) S25 --> CS3((Current state 3)) </pre> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file</p>

	appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.
16. A method as in claim 10, further comprising the steps of: making a new snapshot of the first active file system, the new snapshot initially sharing data with the first active file system; converting the new snapshot to a third active file system by making the new snapshot writable, with changes made to the first active file system or the second active file system not reflected in the third active file system.	<p>Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.</p>  <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
17. A method as in claim 16, wherein when changes are made to the first active file system or the second active file system, modified data is recorded in a location that is not shared with the third active file system.	Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

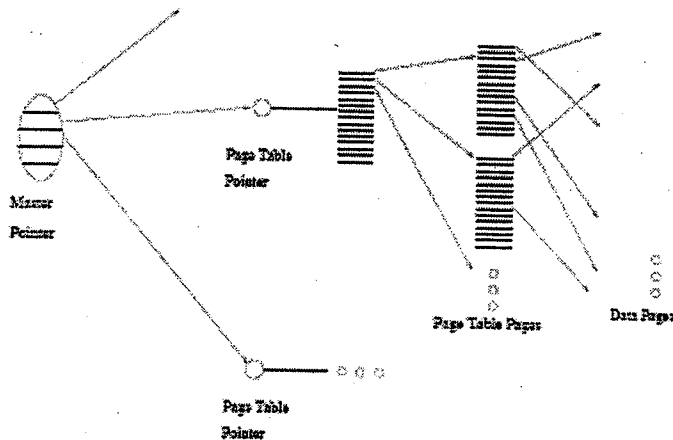


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

18. A method as in claim 10, further comprising the steps of: making a new snapshot of the second active file system, the new snapshot initially sharing data with the second active file system; converting the new

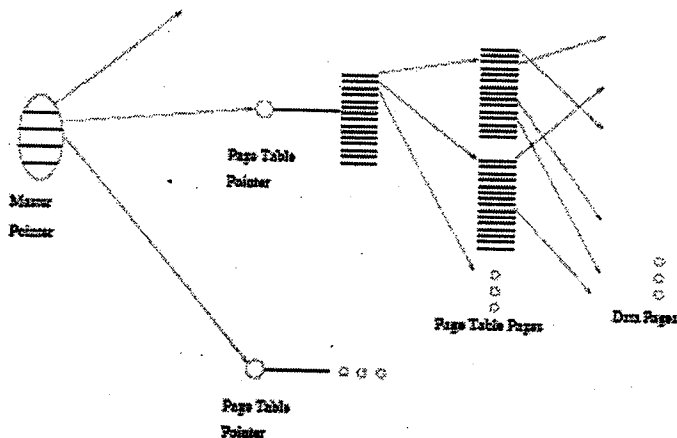
Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.

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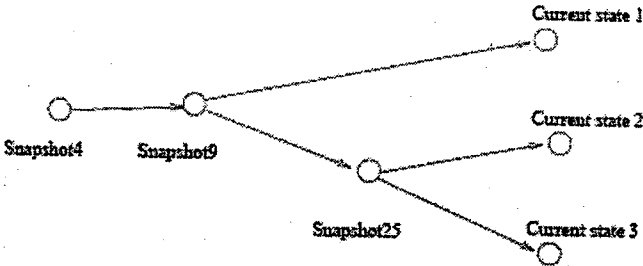
graph LR
    S4((Snapshot4)) --> S9((Snapshot9))
    S9 --> CS1((Current state 1))
    S9 --> CS2((Current state 2))
    S25((Snapshot25)) --> CS3((Current state 3))
  
```

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

Ylonen section 3.4 teaches that “From the user’s point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies.” (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.



In Fig. 5 each Page Table Pointer represents permanent

	<p>snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>20. A memory storing information including instructions, the instructions executable by a processor to operate data storage, the instructions comprising steps to maintain plural active file systems, wherein each of the active file systems initially access data shared with another of the active file systems, and wherein changes made to each of the active file systems are not reflected in the active file system with which the changed active file system shares the data.</p>	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). This is further illustrated in Ylonen Fig.3:</p>  <pre> graph LR S4((Snapshot4)) --- J1(()) S9((Snapshot9)) --- J1 J1 --- S25((Snapshot25)) S25 --- CS2((Current state 2)) S25 --- CS3((Current state 3)) </pre> <p>Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made." Ylonen further</p>

	<p>teaches in section 2, (page 5) that the pages of data are stored on disks operable under the control of a CPU, which inherently operates the data storage device by executing instructions.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
21. A memory as in claim 20, wherein when a second active file system is created based on a first active file system, the first active file system and the second active file system initially share data.	<p>Ylonen teaches in section 3.4 and Fig. 3 that a second active database version (e.g. Current State 2 in Fig. 3) is created based on a first active database version (Current State 1), with the two versions initially sharing data (Snapshot 9).</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
22. A memory as in claim 21, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p>

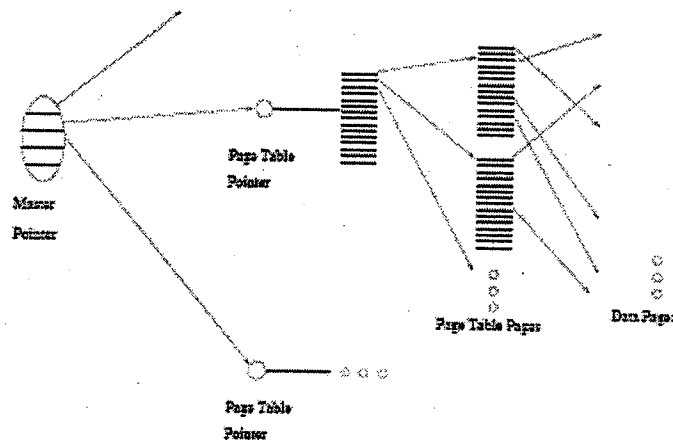


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

23. A memory as in claim 21, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

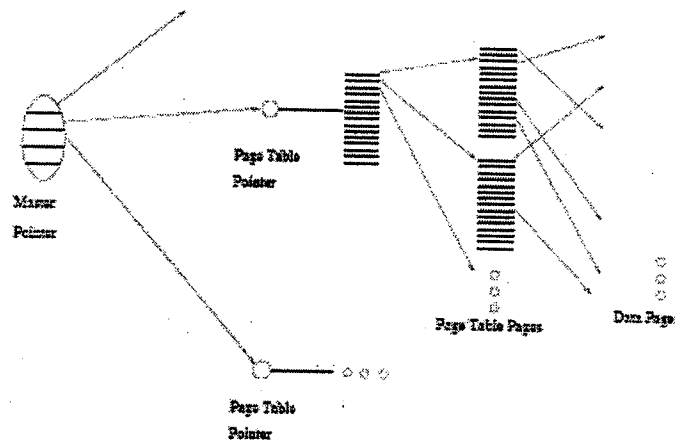


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

24. A memory as in claim 20, wherein snapshots are made of ones of the plural active file systems, each snapshot forming an image of its respective active file system at a past consistency point.

Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots. Ylonen section 3.4 teaches modifying such snapshots that are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy,

and these modifications will not affect other copies.” (page 12). This is further illustrated in Ylonen Fig.3:

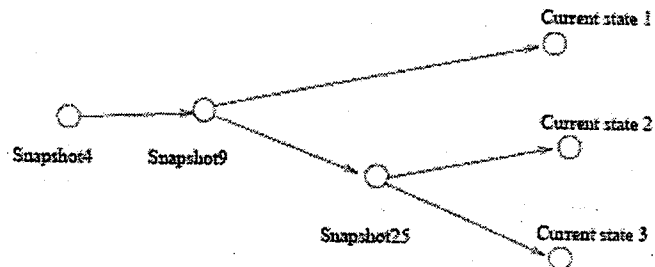


Fig. 3 teaches that Snapshot 9 is an image of active database version Current State 1 at a past consistency point, while Snapshot 25 is an image of active database version Current State 2.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

25. A method as in claim 24, wherein each snapshot includes a complete hierarchy for file system data, separate and apart from active file system data for the plural active file systems.

Ylonen Fig. 5 and the text in section 3.5 teach that each permanent snapshot includes a hierarchy of system data, such as Page Table Pointer and Page Table Pages. Some of these permanent snapshots are active database versions.

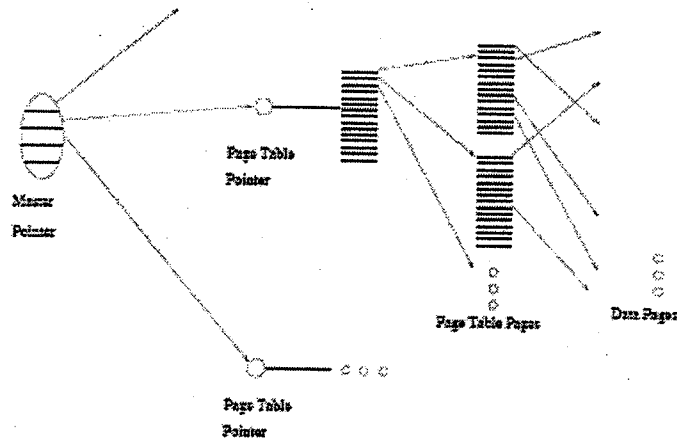


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

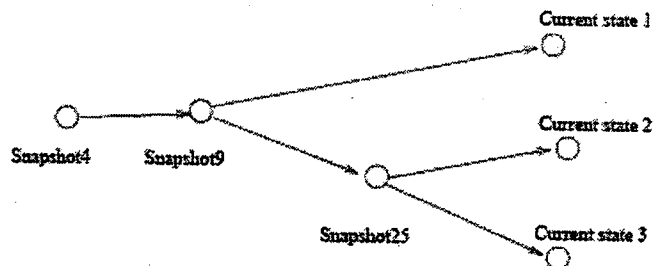
Furthermore, Hitz Figs. 3 and 4 at p. 11 teach that an active file system and snapshots have separate file system data hierarchies.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

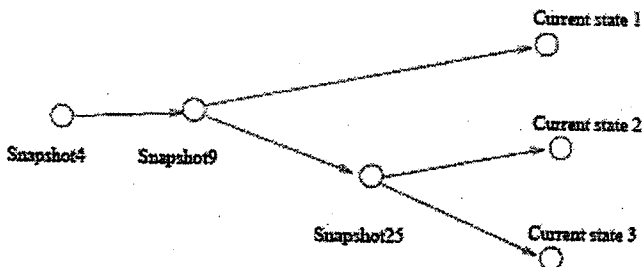
Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

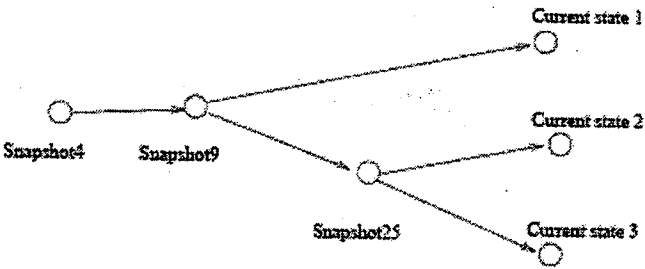
26. A memory as in claim 24, wherein at least one of the snapshots is converted into a new active file system.

Ylonen Fig. 3 teaches snapshots converted to active database versions.



Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-

	<p>write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
27. A memory as in claim 26, wherein the one of the snapshots is converted by making the one of the snapshots writable.	<p>Ylonen section 3.4 teaches allowing modifications to certain snapshots so as to convert them to writable versions, as shown in Fig. 3.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
28. A memory as in claim 27, wherein snapshot pointers from any of the active file systems to the new active file system are severed.	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>  <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-</p>

	<p>write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>29. A memory storing information including instructions, the instructions executable by a processor to create plural active file systems, the instructions comprising the steps of: making a snapshot of a first active file system, the snapshot initially sharing data with the first active file system; and converting the snapshot to a second active file system by making the snapshot writable, with changes made to the first active file system not reflected in the second active file system, and with changes made to the second active file system not reflected in the first active file system.</p>	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). This is further illustrated in Ylonen Fig.3:</p>  <pre> graph LR S4((Snapshot4)) --- S9((Snapshot9)) S4 --- S25((Snapshot25)) S9 --- S25 S25 --- CS1((Current state 1)) S25 --- CS2((Current state 2)) S25 --- CS3((Current state 3)) </pre> <p>Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made." Ylonen further teaches in section 2, (page 5) that the pages of data are stored on disks operable under the control of a CPU, which inherently operates the data storage device by executing instructions.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file</p>

	<p>system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>30. A memory as in claim 29, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.</p>	<p>Ylonen section 3.4 teaches that “From the user’s point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies.” (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p> <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p> <p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file</p>

system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

31. A memory as in claim 29, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.

Ylonen section 3.4 teaches that “From the user’s point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies.” (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

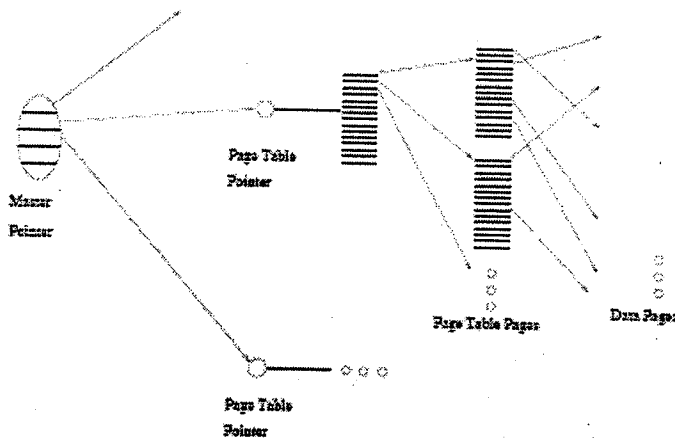
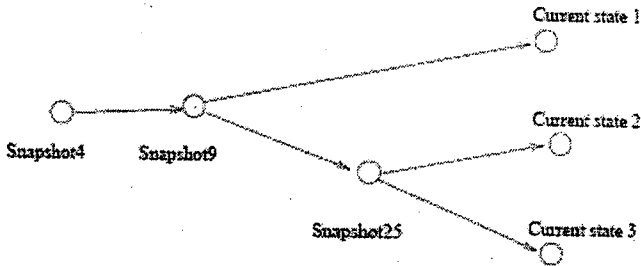
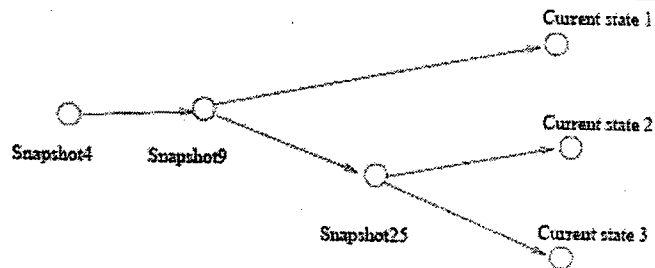


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file

	<p>system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>32. A memory as in claim 29, wherein the instructions further comprise the step of severing any snapshot pointers from the first active file system to the second active file system.</p>	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>  <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>33. A memory as in claim 29, wherein the instructions further comprise the steps of making snapshots of ones of the plural active file systems.</p>	<p>Fig. 3 of Ylonen teaches that Snapshot 9 is a snapshot of active database version Current State 1 while Snapshot 25 is a snapshot of active database version Current State 2.</p>



Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

34. A memory as in claim 33, wherein each snapshot includes a complete hierarchy for file system data, separate and apart from active file system data for the plural active file systems.

Ylonen Fig. 5 and the text in section 3.5 teach that each permanent snapshot includes a hierarchy of system data, such as Page Table Pointer and Page Table Pages. Some of these permanent snapshots are active database versions.

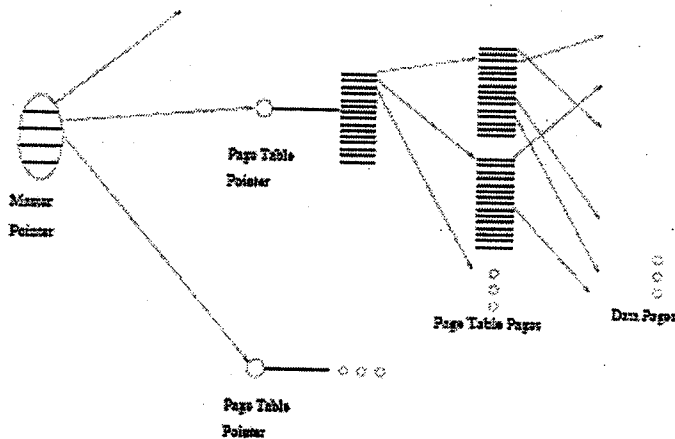
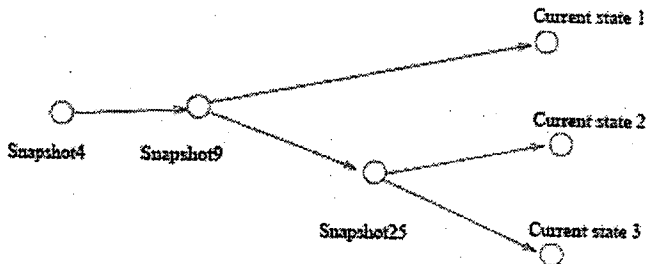


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

Furthermore, Hitz Figs. 3 and 4 at p. 11 teach that an active file system and snapshots have separate file system data hierarchies.

	<p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>35. A memory as in claim 29, wherein the instructions further comprise the steps of: making a new snapshot of the first active file system, the new snapshot initially sharing data with the first active file system; converting the new snapshot to a third active file system by making the new snapshot writable, with changes made to the first active file system or the second active file system not reflected in the third active file system.</p>	<p>Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.</p>  <pre> graph LR S4((Snapshot4)) --> S9((Snapshot9)) S9 --> CS1((Current state 1)) S9 --> S25((Snapshot25)) S9 --> CS2((Current state 2)) S25 --> CS3((Current state 3)) </pre> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>36. A memory as in claim 35, wherein when changes are made to the first active file system or</p>	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these</p>

the second active file system, modified data is recorded in a location that is not shared with the third active file system.

modifications will not affect other copies.” (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

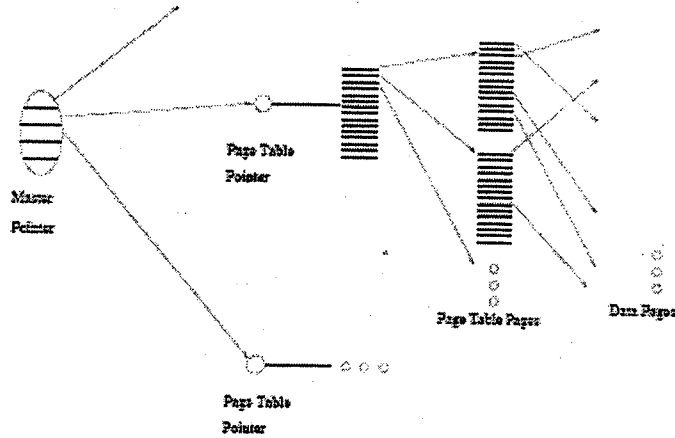


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.

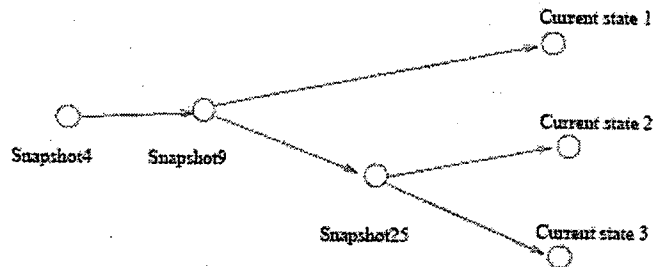
Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

37. A memory as in claim 29, wherein the instructions further comprise the steps of: making a

Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is

new snapshot of the second active file system, the new snapshot initially sharing data with the second active file system; converting the new snapshot to a third active file system by making the new snapshot writable, with changes made to the first active file system or the second active file system not reflected in the third active file system.

converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.



Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

38. A memory as in claim 37, wherein when changes are made to the first active file system or the second active file system, modified data is recorded in a location that is not shared with the third active file system.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

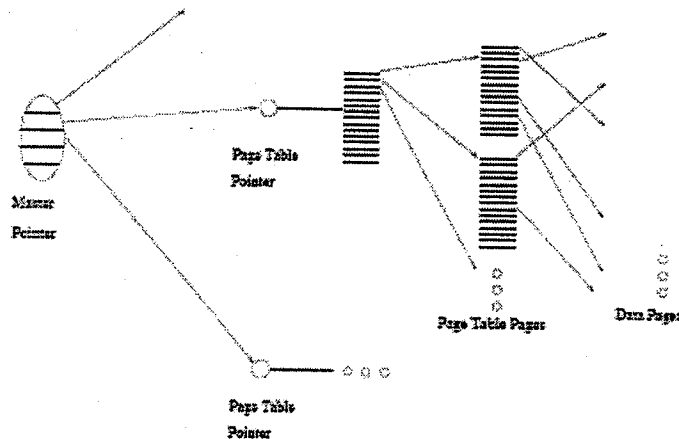


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

39. A storage system, comprising: at least one storage device; an interface to at least one computing device or network for receiving and sending information; and a controller that controls storage

Hitz at p. 4 teaches a file server appliance interfacing to a network. The disclosed file server inherently has a controller that operates under WAFL file system program control to store and retrieve information. Hitz at p. 4 further teaches that WAFL uses copy-on-write technique to implement snapshots. Hitz at p. 5 teaches that the file server appliance and WAFL support RAID (Redundant Array of Independent

and retrieval of the information in the storage device, the controller operating under program control to maintain plural active file systems, wherein each of the active file systems initially access data shared with another of the active file systems, and wherein changes made to each of the active file systems are not reflected in the active file system with which the changed active file system shares the data.

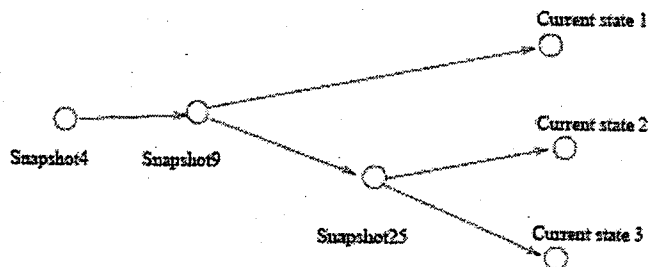
Disks), constituting at least one storage device.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.

Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). This is further illustrated in Ylonen Fig.3:



Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time for database can be used in file systems. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."

40. A storage system as in claim 39, wherein when a second active file system is created based on a first active file

Ylonen teaches in section 3.4 and Fig. 3 that a second active database version (e.g. Current State 2 in Fig. 3) is created based on a first active database version (Current State 1), with the two versions initially sharing data (Snapshot 9).

system, the first active file system and the second active file system initially share data.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

41. A storage system as in claim 40, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

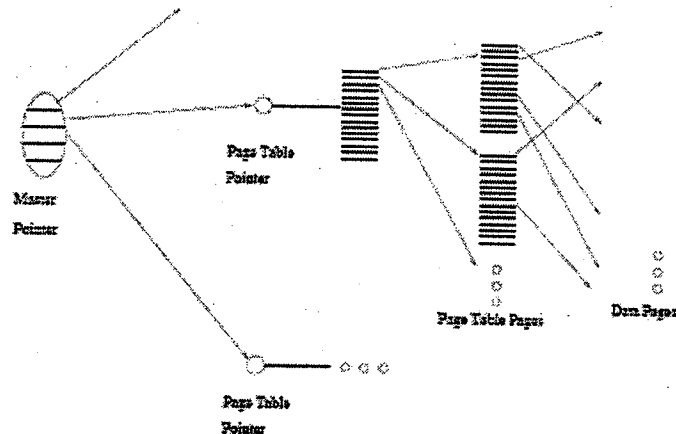
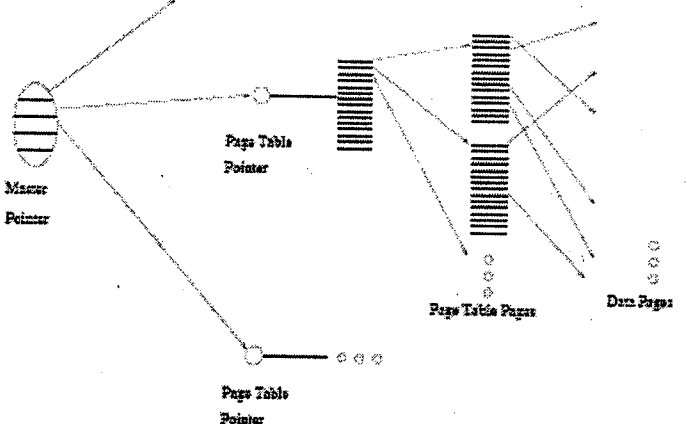
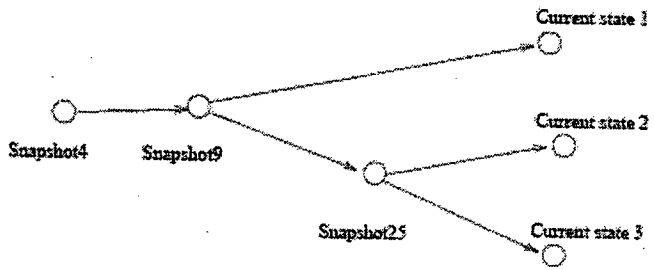


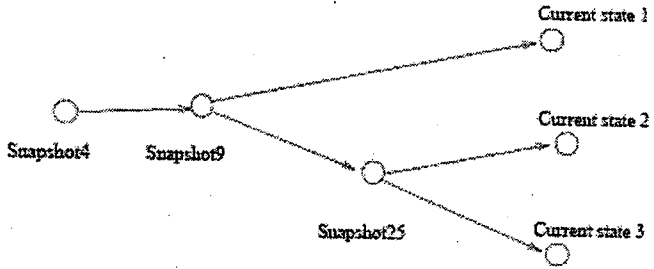
Figure 5: Shadow paging file structure with a master pointer and multiple versions.

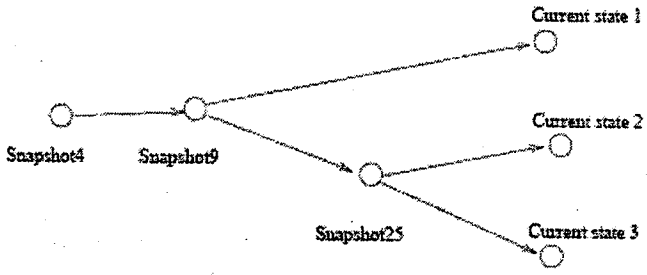
In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.

	<p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>42. A storage system as in claim 40, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.</p>	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p>  <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p> <p>In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the</p>

	<p>'001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>43. A storage system as in claim 39, wherein snapshots are made of ones of the plural active file systems, each snapshot forming an image of its respective active file system at a past consistency point.</p>	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches modifying such snapshots that are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). This is further illustrated in Ylonen Fig.3:</p>  <p>Fig. 3 teaches that Snapshot 9 is an image of active database version Current State 1 at a past consistency point, while Snapshot 25 is an image of active database version Current State 2.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p>

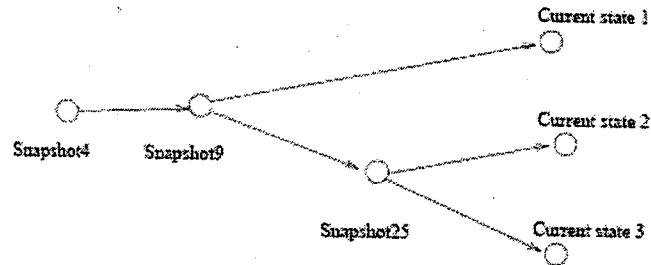
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	 <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>46. A storage system as in claim 45, wherein the one of the snapshots is converted by making the one of the snapshots writable.</p>	<p>Ylonen section 3.4 teaches allowing modifications to certain snapshots so as to convert them to writable as shown in Fig. 3, and as discussed in section 3.4.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>47. A storage system as in claim 46, wherein snapshot pointers from any of the active file systems to the new active file system are severed.</p>	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>

	 <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>48. A storage system, comprising: at least one storage device; an interface to at least one computing device or network for receiving and sending information; and a controller that controls storage and retrieval of the information in the storage device, the controller operating under program control to create plural active file systems, the program control comprising the steps of: making a snapshot of a first active file system, the snapshot initially sharing data with the first active file system; and converting the snapshot to a second active file system by making the snapshot writable, with changes made to the first active file system not reflected in the second active file system, and with changes made to the second active file system not</p>	<p>Hitz at p. 4 teaches a file server appliance interfacing to a network. The disclosed file server inherently has a controller that operates under WAFL file system program control to store and retrieve information. Hitz at p. 4 further teaches that WAFL uses copy-on-write technique to implement snapshots. Hitz at p. 5 teaches that the file server appliance and WAFL support RAID (Redundant Array of Independent Disks), constituting at least one storage device.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p> <p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow</p>

reflected in the first active file system.

paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots. Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." This is further illustrated in Ylonen Fig.3:



Thus, as would be readily appreciated by one of ordinary skill in the art, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."

49. A storage system as in claim 48, wherein when changes are made to the first active file system, modified data is recorded in the first active file system in a location that is not shared with the second active file system.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

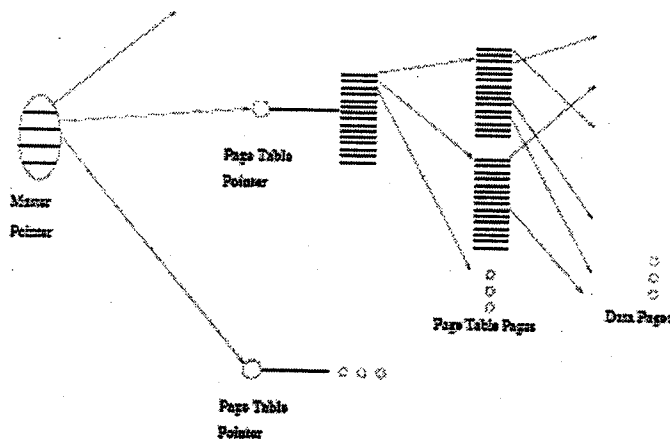
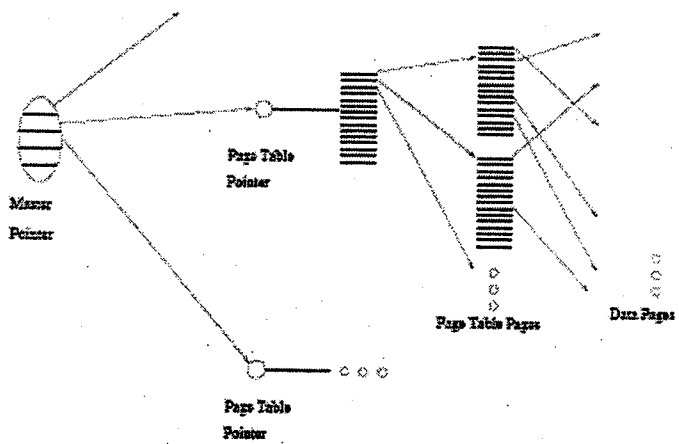
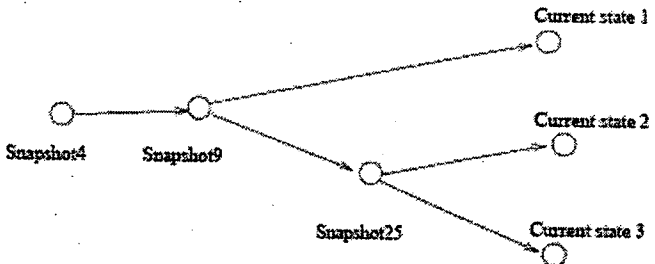


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

	<p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>50. A storage system as in claim 48, wherein when changes are made to the second active file system, modified data is recorded in the second active file system in a location that is not shared with the first active file system.</p>	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p>  <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p>

	<p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>51. A storage system as in claim 48, wherein the program control further comprises the step of severing any snapshot pointers from the first active file system to the second active file system.</p>	<p>Ylonen section 3.4 and Fig. 3 teach that active database versions are independent and unsynchronized, diverging over time. Fig. 3 further shows that there are no snapshot pointers between any of the active database versions. Snapshot pointers point only from snapshots to their respective active database versions.</p>  <pre> graph LR S4((Snapshot4)) --> CS1((Current state 1)) S9((Snapshot9)) --> CS1 S9 --> CS2((Current state 2)) S25((Snapshot25)) --> CS2 S25 --> CS3((Current state 3)) </pre> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of</p>

	<p>the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>52. A storage system as in claim 48, wherein the program control further comprises the steps of making snapshots of ones of the plural active file systems.</p>	<p>Fig. 3 teaches that Snapshot 9 is a snapshot of active database version Current State 1 while Snapshot 25 is a snapshot of active database version Current State 2.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>53. A storage system as in claim 52, wherein each snapshot includes a complete hierarchy for file system data, separate and apart from active file system data for the plural active file systems.</p>	<p>Ylonen Fig. 5 and the text in section 3.5 teach that each permanent snapshot includes a hierarchy of system data, such as Page Table Pointer and Page Table Pages. Some of these permanent snapshots are active database versions.</p>

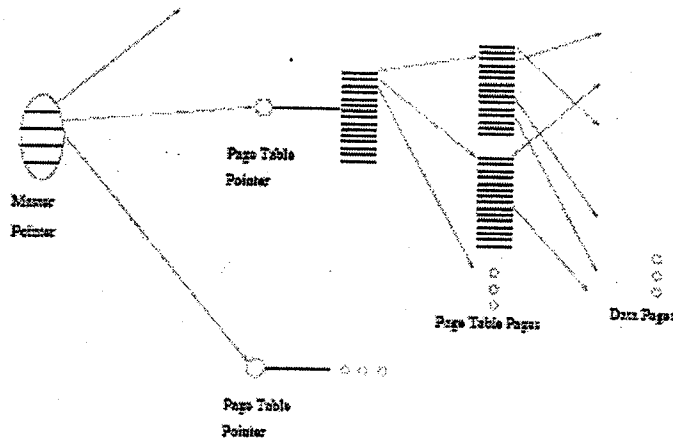


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

Furthermore, Hitz Figs. 3 and 4 at p. 11 teach that an active file system and snapshots have separate file system data hierarchies.

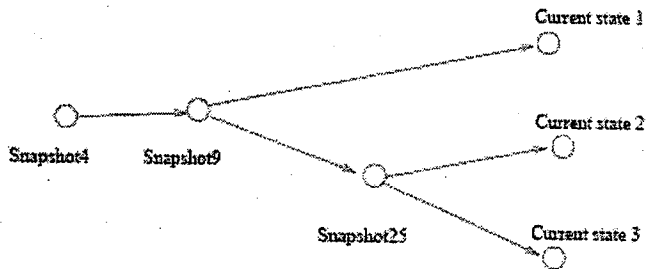
Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

54. A storage system as in claim 48, wherein the program control further comprises the steps of: making a new snapshot of the first active file system, the new snapshot initially sharing data with the first active file system; converting the new snapshot to a third active file system by making the new snapshot writable, with changes made to the first active file system or the second active file system not

Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.

reflected in the third active file system.



Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that “file system,” as claimed in the '001 patent, includes “databases,” and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

55. A storage system as in claim 54, wherein when changes are made to the first active file system or the second active file system, modified data is recorded in a location that is not shared with the third active file system.

Ylonen section 3.4 teaches that “From the user’s point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies.” Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

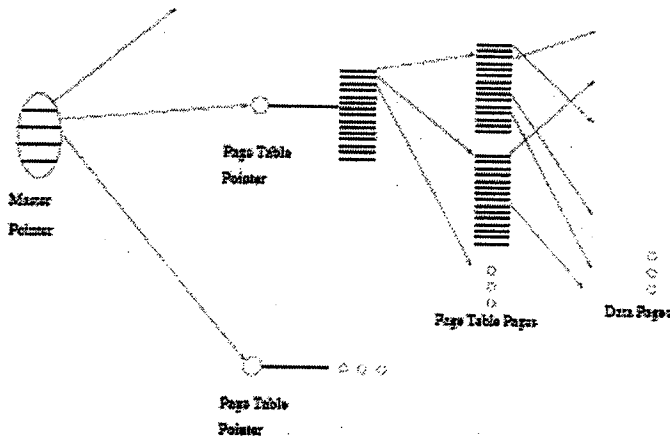
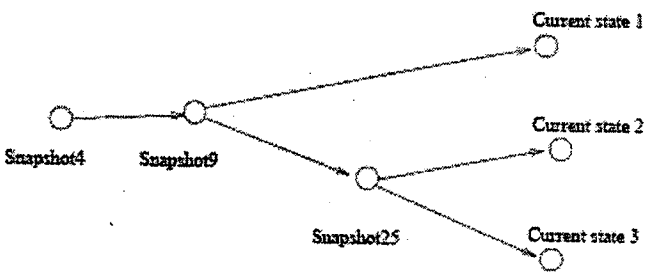
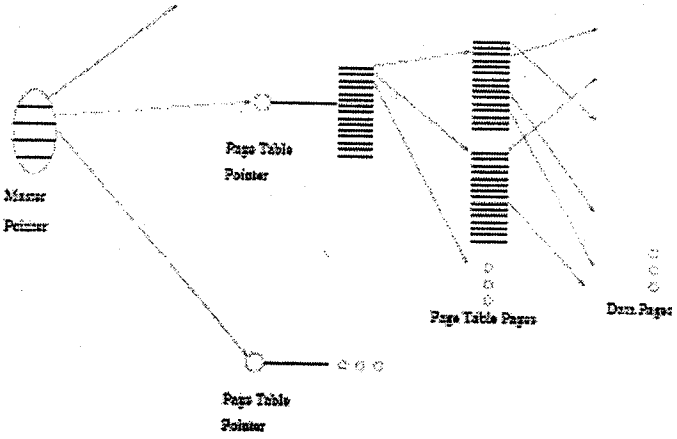
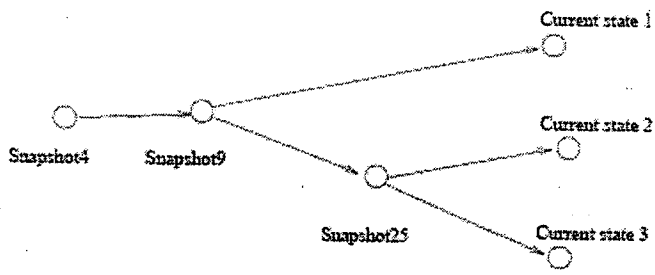


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the

	<p>database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>56. A storage system as in claim 48, wherein the program control further comprises the steps of: making a new snapshot of the second active file system, the new snapshot initially sharing data with the second active file system; converting the new snapshot to a third active file system by making the new snapshot writable, with changes made to the first active file system or the second active file system not reflected in the third active file system.</p>	<p>Ylonen Fig. 3 teaches making Snapshot 25 that initially shares data with active database version Current State 1 as both share the same parent Snapshot 9. Snapshot 25 is converted to active database version Current State 2. Changes made in each of Current State 1, Current State 2 and Current State 3 are not reflected in the other active database versions.</p>  <pre> graph LR S4((Snapshot 4)) --> S9((Snapshot 9)) S9 --> CS1((Current state 1)) S9 --> CS2((Current state 2)) S25((Snapshot 25)) --> CS3((Current state 3)) </pre> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p>

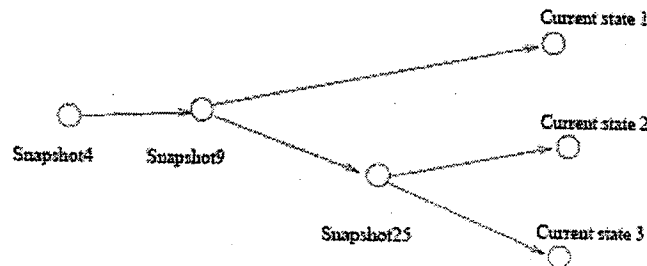
	<p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
<p>57. A storage system as in claim 56, wherein when changes are made to the first active file system or the second active file system, modified data is recorded in a location that is not shared with the third active file system.</p>	<p>Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.</p>  <p>Figure 5: Shadow paging file structure with a master pointer and multiple versions.</p> <p>In Fig. 5 each Page Table Pointer represents permanent snapshots, some or all of which are active versions of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p>

	Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.
58. An apparatus for operating data storage, the apparatus including means for creating plural active file systems and means for maintaining plural active file systems, wherein each of the active file systems initially access data shared with another of the active file systems, and wherein changes made to each of the active file systems are not reflected in the active file system with which the changed active file system shares the data.	<p>Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further illustrates maintaining multiple snapshots.</p> <p>Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." This is further illustrated in Ylonen Fig.3:</p>  <pre> graph LR S4((Snapshot4)) --- J1(()) S9((Snapshot9)) --- J1 S9 --- S25((Snapshot25)) S25 --- CS1((Current state 1)) S25 --- CS2((Current state 2)) S25 --- CS3((Current state 3)) </pre> <p>Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
59. An apparatus for creating plural active file systems, comprising: means for making a	Ylonen section 3 teaches maintaining snapshots that are a transaction-consistent copy of a database through shadow paging techniques. Fig. 2 in Ylonen section 3.1 further

snapshot of a first active file system, the snapshot initially sharing data with the first active file system; and means for converting the snapshot to a second active file system by making the snapshot writable, with changes made to the first active file system not reflected in the second active file system, and with changes made to the second active file system not reflected in the first active file system.

illustrates maintaining multiple snapshots.

Ylonen section 3.4 teaches that such snapshots are a copy-on-write copy of the database. "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." This is further illustrated in Ylonen Fig.3:



Thus, the writable snapshots of Ylonen initially access shared data and grow apart over time. For example, Current State 3 and Current State 2 in Fig. 3 above initially access data of parent Snapshot 25. Ylonen section 3.4 teaches that "copies diverge as more modifications are made."

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

60. A method of operating data storage, comprising: making a snapshot of organizational data of a first active file system, the snapshot pointing to original non-organizational data of the first active file system; storing the snapshot; modifying a first portion of the original non-organizational data of the first active file system in response to

Hitz section 3.4 and Figs. 3 and 4 teach taking a snapshot of a root inode (file system organizational data), the root inode pointing to original data blocks (non-organizational data, labeled as A-E in Fig. 3). When original data blocks are modified (block D' in Fig. 3(c)) in response to a WAFL write operation, the modified data blocks become part of modified data blocks of the file system, as shown in Fig. 3(c). The modified block D' are written so as not to overwrite the original block D, which is still pointed to by the snapshot (see Hitz p. 10). As further shown in Figs. 3(b) and 3(c), the snapshot root inode points to original data blocks, while the

a first active file system access request, resulting in a modified first portion being part of first modified non-organizational data of the first active file system; and storing the modified first portion so as not to overwrite the first portion; wherein, after the step of storing the modified first portion, the snapshot points to the original non-organizational data, the organizational data of the first active file system point to the first modified non-organizational data of the first filing system, and the original non-organizational data and the first modified non-organizational data partially overlap.

active file system inode points to modified data blocks, with the two sets of data blocks partially overlapping:

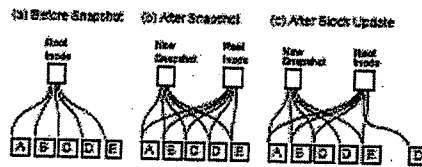


Figure 3

WAFL creates a Snapshot by duplicating the root inode that describes the inode file. WAFL avoids changing blocks in a Snapshot by writing new data to new locations on disk.

Ylonen sections 2 and 3 and Fig. 1 teach a shadow paging method of snapshotting that is equivalent to the copy-on-write snapshots taught by Hitz and described above.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

61. A method according to claim 60, wherein: the step of storing the snapshot comprises storing the snapshot as a second active filing system; the method further comprising: modifying a second portion of the original non-organizational data in response to a second active file system access request, resulting in a modified second portion being part of second modified non-organizational data of the second active file system; and storing the modified second portion so as not to overwrite the second portion; wherein,

Ylonen section 3.4 and Fig. 3 teach that a snapshot can be converted to a second active database version.

Ylonen section 3.4 teaches that "From the user's point of view, each snapshot is an independent copy of the database. It is possible to make modifications to the copy, and these modifications will not affect other copies." (page 12). Ylonen Fig. 5 and the text in section 3.5 further teach that active database versions do not share changed data locations.

after the step of storing the modified second portion, the snapshot points to the second modified non-organizational data, the organizational data of the first active file system point to the first modified non-organizational data, and the first modified non-organizational data and the second modified non-organizational data partially overlap.

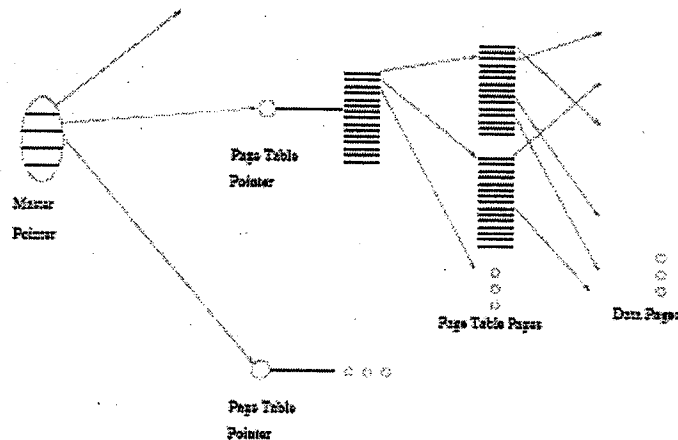


Figure 5: Shadow paging file structure with a master pointer and multiple versions.

In Fig. 5 each Page Table Pointer represents an active version of the database. As taught in Ylonen section 2, the shadow paging technique (also known as copy-on-write) requires that changes in Data Pages are recorded in Page Table Pages. As database versions disclosed in Ylonen Fig. 5 diverge over time the respective Page Table Pages are not shared. In addition, changed Data Pages are recorded in different locations using shadow paging / copy-on-write techniques. Thus, once a snapshot becomes an active database version, its organizational data (table pointers and page tables) point to modified data pages (non-organizational data). These data pages partially overlap with those of other active database versions, but diverge over time.

Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.

Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.

62. A method according to claim 61, wherein the step of making a snapshot is performed at a

Ylonen section 3 at p. 7 teaches that "[a] snapshot is a transaction-consistent copy of the database." Thus, transaction consistency represents a consistency point.

consistency point of the first active file system.	<p>Hitz section 3.5 at p. 12 further discloses taking snapshots at consistency points.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>
63. A method according to claim 62, wherein data is stored in the first and second active file systems using blocks.	<p>Hitz in section 3 teaches storing snapshot data using blocks.</p> <p>Author David Hitz, also one of the named inventors of the '001 Patent, admits in section 3.5 (page 12) that copy-on-write snapshot techniques implemented in the WAFL file system, the preferred embodiment of the '001 Patent, are well known for databases. Thus, as a matter of claim construction, one of ordinary skill in the art would understand that "file system," as claimed in the '001 patent, includes "databases," and the claim is anticipated by Ylonen with the admission of the named inventor.</p> <p>Alternatively, one of ordinary skill in the art would readily appreciate that the database snapshots taught in Ylonen can be implemented with file system snapshots taught in Hitz.</p>

Second Basis of Invalidity

The reference applicable to the second basis of invalidity is:

1. Veritas File System 3.4 Administrator's Guide, November 2000 ("VxFS").

The pertinence and manner of applying VxFS to claims 1-63 for which re-examination is requested is as follows:

Claims of '001 Patent	VxFS
1. A method of operating data	VxFS discloses a file system. Chapter 8 discloses storage